ITM2B gene

integral membrane protein 2B

Normal Function

The *ITM2B* gene provides instructions for producing a protein called the integral membrane protein 2B (ITM2B), which is found in all tissues. The function of the ITM2B protein is unclear. It is thought to play a role in triggering the self-destruction of cells (apoptosis) and in keeping cells from growing and dividing too fast or in an uncontrolled way (suppressing tumor formation). Additionally, the ITM2B protein may be involved in processing the amyloid precursor protein, which is produced by the *APP* gene. Not much is known about amyloid precursor protein function, but it is thought to be involved in nerve cell function in the brain in early development. Processing this protein creates different forms of the protein that can carry out various functions. Research suggests that the ITM2B protein is also involved in preventing (inhibiting) a form of the amyloid precursor protein from accumulating in the body's cells and tissues.

Health Conditions Related to Genetic Changes

hereditary cerebral amyloid angiopathy

Two mutations in the *ITM2B* gene have been found to cause a condition called hereditary cerebral amyloid angiopathy. When this condition is caused by mutations in the *ITM2B* gene, it is characterized by movement problems and a decline in intellectual function (dementia). *ITM2B* gene mutations cause two forms of the condition called familial British dementia and familial Danish dementia, named for the regions where the conditions were first diagnosed. The *ITM2B* gene mutation that causes the British type results in the production of a protein that is longer than normal. The ITM2B protein normally has a stop signal that indicates where to stop the protein sequence so that all the ITM2B proteins that are made are the same. The mutation that causes the British type changes the stop signal so that more length is added to the protein. This mutation is written as Ter267Arg or X267R. The mutation that causes the Danish type is similar, but instead of changing the stop signal, extra pieces of DNA are added to the gene, which means that the protein is longer. This mutation is written as 795-796insTTTAATTTGT.

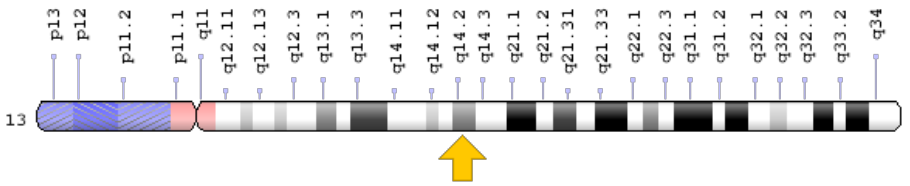
The *ITM2B* gene mutations that cause the British type or the Danish type produce elongated proteins, known as ABri or ADan respectively, with altered 3-dimensional shapes that tend to cluster together (aggregate). These aggregated proteins form clumps called amyloid deposits, which accumulate in specific areas of the brain and in its blood vessels. The amyloid deposits, known as plaques, trigger activation

of the complement system, which is a group of immune system proteins that work together to destroy pathogens, trigger inflammation, and remove debris from cells and tissues. Other immune system reactions are also activated, which all attack the area surrounding the deposit. The complement system and other reactions lead to cell death and tissue damage in various parts of the brain. These abnormalities underlie the signs and symptoms of the familial British dementia and familial Danish dementia types of hereditary cerebral amyloid angiopathy.

Chromosomal Location

Cytogenetic Location: 13q14.2, which is the long (q) arm of chromosome 13 at position 14.2

Molecular Location: base pairs 48,233,138 to 48,262,096 on chromosome 13 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ABRI
- BRI2
- BRICD2B
- E25B
- ITM2B_HUMAN

Additional Information & Resources

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28ITM2B%5BTIAB%5D%29+OR+%28BRI2%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D

OMIM

- INTEGRAL MEMBRANE PROTEIN 2B
  http://omim.org/entry/603904

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ITM2B.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ITM2B%5Bgene%5D
- HGNC Gene Family: BRICHOS domain containing
  http://www.genenames.org/cgi-bin/genefamilies/set/457
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=6174
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/9445
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  http://www.uniprot.org/uniprot/Q9Y287

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https://ghr.nlm.nih.gov/gene/ITM2B

Reviewed: May 2012
Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
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